HARTMANN ELEKTRONIK
A Phoenix Mecano Company

User's Manual

CPCI Basic 3U, 30HP

CPCI Basic 3,5U, 42HP

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Impressum:
Hartmann Elektronik GmbH
Motorstraße 43, D-70499 Stuttgart (Weilimdorf)
Telefon + 49 711 1 39 89-0
Telefax + 49 711 8 66 11 91
E-mail info @ hartmann-elektronik.de
Internet www.hartmann-elektronik.de

Hartmann Elektronik is a longstanding partner of the embedded industry and has a variety of different backplanes. With our wide selection of backplanes and enclosure you can build your perfect system platform

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1 Applicability

System name	Order number
CPCI Basic 3 U 30 HP Depth 250 mm, 4 Slot, 5V, ATX	LMH0000112
CPCI Basic 3,5 U 42 HP Depth 280 mm, 7 Slot, 5V, ATX	LMH0000391
CPCI Basic 3,5 U 42 HP Depth 280 mm, 7 Slot, 3,3V, ATX	LMH0000401

1.1 Background Information

- User Manual Hartmann cPCI Backplanes
- Technical Data Hartmann CPCI Backplanes
- User Guide Hartmann CPCI Backplanes
- IEC 60297-3-101, -102, -103
- PICMG 2.0 R3.0 CPCI Core Specification
- PICMG 2.01 R2.0 Hot Swap
- PICMG 2.09 R1.0 System Management Bus
- PICMG 2.10 R1.0 Keying
- IEC 1000-4-4 Electromagnetic Compatibility, Part 4, Section 4, Electrical fast transient/burst immunity test.
- EN60950-1
- Shock:
    - MIL-STD-810F 1 January 2000 Annex C, U.S highway truck Figure 514.5C-1, vertical Shock test (Sawtooth) Figure 516.5-10
- Vibration:
    - DIN EN 61373:1999, Figure 2, Category 1, Class B
    - MIL-STD-810F 1 January 2000 Annex C, Shipboard: Figure 514.5C-15

2 Safety

2.1 Intended Application

The CPCI System Platform Basic subracks is intended as a platform for a microcomputer system based on the CPCI Standard PICMG 2.0 R3.0.

CPCI System Platform Basic subracks are not end-products, so there is no valid approval for this unit. In Order to enable stand-alone functionality, additional elements are required. An operational system is achieved only by way of appropriate CPCI boards.

The completion and final testing of the units have been carried out, or at least supervised, by qualified technicians. These instructions are directed exclusively to these qualified technicians i.e. engineers, trained and qualified electricians etc.

Make sure that the finished system complies with the safety regulations currently applicable in the country it is going to be used.

2.2 Safety Symbols

	Hazardous voltage! *Familiarise yourself with the danger of electrical voltages and the safety precautions before starting to work with parts that carry dangerous voltages*

	Caution! *This symbol indicates a condition where damage of the equipment or injury of the service personnel could occur. To reduce the risk of damage or injury, follow all steps or procedures as instructed.*

	Danger of electrostatic discharge! *Static electricity can damage sensitive components in a system. To avoid damage, wear ESD wrist straps or at regular intervals touch blank enclosure parts.*

2.3 General Safety Precautions

	Warning! *Voltages over 60 VDC can be present in this equipment. This equipment is intended to be accessed, to be installed and maintained by qualified and trained service personnel only.* *This equipment is designed in accordance with protection class 1!* *Lt must therefore be operated only with protective GND/earth connection!*

2.4 Safety Instructions

The intended audience of this User's Manual is system Integrators and hardware/software engineers.

The product has been designed to meet relevant standard industrial safety requirements. It must not be used except in its specific area of office telecommunication industry and industrial control. It shall not be used in safety-critical applications, life-sustaining appliances or in aircraft.

Only trained personnel or persons qualified in electronics or electrical engineering are authorized to install, operate or maintain the product.

This section provides safety information about:

- Protection Against Electromagnetic Interference (EMI)
- Electrostatic Discharge Precautions
- System Installation

2.4.1 Protection Against Electromagnetic Interference (EMI)

The product has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules, EN 55022 Class A.

To ensure proper EMC shielding, operate the subrack only with all free slots populated with filler panels.

Ensure that all EMI gaskets make correct contact.

2.4.2 Electrostatic Discharge Precautions

Electronic components can easily be destroyed by electrostatic discharge which can occur between subrack components and a person.

- Before working on the rack make sure that you are working in an ESD-safe environment.

2.4.3 Installation

To avoid subrack damage verify that the system environment meets the environmental and power requirements given in this guide before installation consider these guidelines:

2.4.4 Location

Locate the system in a stable area free of excessive movement and jarring, dust, smoke, and electrostatic discharge (ESD). Make sure that the temperature does not exceed the operating temperature given in the environmental requirements in this guide and allow room for proper air flow for cooling.

2.4.5 Voltage Hazards

The system is powered with a power supply the mains voltage is 115/230VAC. (Voltage range 85VAC to 265VAC)

This voltage is considered hazardous.

2.4.6 System Overheating

The boards are cooled by heat dissipation through convection or by fans (bottom to top).

Ensure that other equipment below or on top of the subrack do not obstruct the airflow through the systems.

The subrack ambient temperature may not exceed 40°C.

2.4.7 Mounting Considerations

During the course of handling, shipping, and assembly, parts could become loose or damaged.
Do not operate a shelf in this condition, as this may cause damage to other equipment.

2.4.8 Electrical Hazards

The caution label on the system's rear near the grounding studs shows that you have to create an earth connection because there may be a high leakage current which is considered hazardous.

High leakage current can cause injuries.
Ensure that the system is properly grounded at all times, the following conditions shall be met:

- This equipment shall be connected directly to the AC supply system earthing

2.4.9 Board Installation

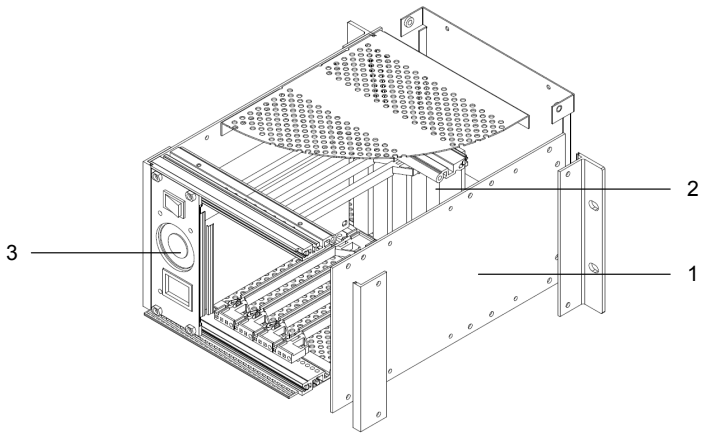
Electrostatic discharge and incorrect board installation or removal can damage circuits or shorten their life.

- Before touching the boards, rear transition module or electronic components, make sure that you are working in an ESD-safe environment
- Boards should be inserted and removed using their handles, do not force the board by applying pressure to the front panel.

3 Product Description

3.1 System Overview

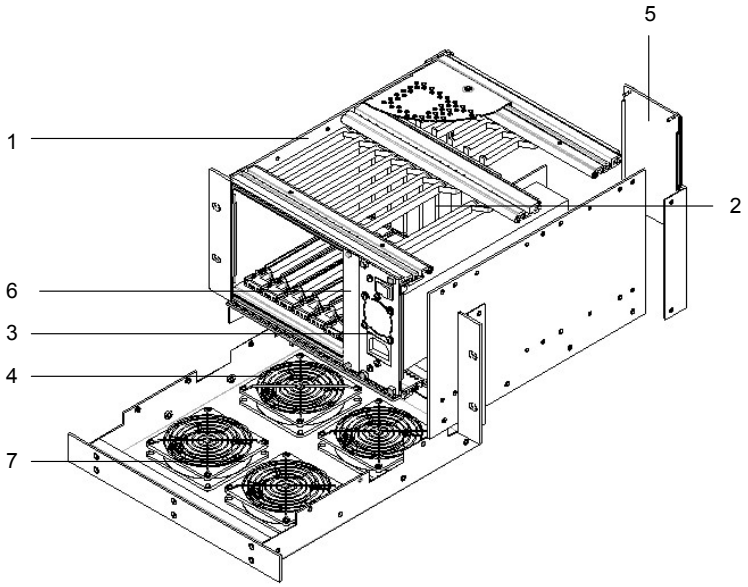
3.1.1 CPCI Basic 3 U 30 HP



1	CompactPCI card rack, 3U, 30HP	2	CPCI backplane: 3U, 4 slot, system slot right, V(I/O) = 5V, ATX connector
3	ATX Power Supply 180 W, front panel 3U 10HP	6	

Figure 3-1: CPCI Basic 3 U 30 HP

3.1.2 CPCI Basic 3,5 U 42 HP



1	CompactPCI card rack, 3,5U, 42HP	4	2 x DC fans : 80 x 80 x 15mm, 29,9 CFM, 33,4 dB(A)
2	CPCI backplane: 3U, 7 slot, system slot right, rear I/O, V(I/O) = 5V (3,3V) ATX connector	5	1 x Filler panel 12HP, 3U with EMC gasket
3	ATX Power Supply 180 W, front panel 3U 10HP	6	1 x Filler panel 4HP, 3U with EMC gasket
7	2 x DC fans : 80 x 80 x 25mm, 28,5 CFM, 38 dB(A)		

Figure 3-2: CPCI Basic 3,5 U 42 HP

3.2 Subracks

CPCI Basic 3U:
Subrack screened, with rear panel, made of galvanized sheet steel, cover and bottom plate perforated, with IEEE guide rails and ESD clip mounted at the bottom

CPCI Basic 3.5U:
Subrack cover and bottom plate perforated, made of chromated aluminum, with IEEE guide rails and ESD clip mounted at the bottom

3.3 Backplanes

3.3.1 CPCI Backplane

General and technical Information

The CompactPCI bus is compatible with the PCI bus known from the PC world as far as the electrical specifications are concerned.
The mechanical specifications were adapted to the commonly used Euro-board plug-in system in the 19” card rack. Therefore this bus is also suitable for industrial purposes. Previously unattained signal speeds supported by the layout technology developed by Hartmann Elektronik guarantee more stability and reliability for assemblies operating in the limit range.

The backplanes manufactured by Hartmann Elektronik are distinguished by a completely novel energy buffering feature which works across the entire frequency range.
This feature guarantees improved reliability thanks to more stable supply voltages directly at the slot in conjunction with fluctuating loads.

Chassis GND connection

A continuous electrically conductive chassis GND surface is located in the area where the bus board is mounted on the card rack. An M3 screw connection is available to connect the chassis ground. By installing a connecting bracket or terminal bar, the chassis GND can be connected to GND in a low-resistance star arrangement.

JTAG connector

A separate 6-pin connector for JTAG boundary scan is implemented on the backplane.
Faster, simpler system initialization and testing by means of the JTAG bus even in the completely mounted state are achieved by direct access via an additional connector on the backplane.

IPMB connector

A separate 5-pin connector for IPMB extension is implemented on the backplane.

Utility connector

The special signals to the power supply unit and external LEDs are routed to separate plug-in connectors on the backplanes. Depending on the backplane type, either a 10-pin or a 14-pin connector is used.

ATX connector

The ATX power supply connector used in the PC world is integrated in some backplane variants.

This results in a highly efficient and economic solution for supplying power to the backplane via ATX connectors and for the wiring of fans and drives.

3.3.2 Backplane CPCI 3U with ATX connector

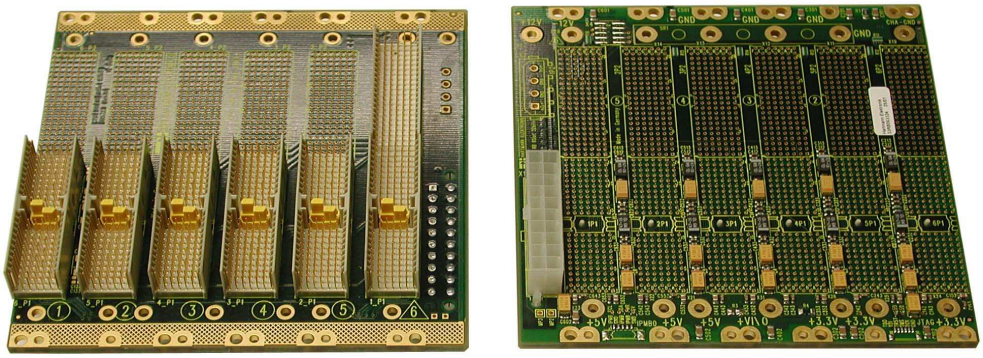


Figure 3-3: Backplane CPCI 3U with ATX connector (front / rear)

3.4 Electrical Connection and Power Supply

3.4.1 Grounding/Protective Earthing

The system contains gaskets at the subrack and board level to guard against electromagnetic interference (EMI). Each of the subrack's individual components make contact with the gaskets and to the PE-stud inside the rear panel.

The guide rails are also fitted with electrostatic discharge (ESD) contacts for each blade and RTM. These ESD contacts ensure that the boards are fully discharged to prevent static caused by static as they are plugged into the subrack.

	Caution! *The subrack is designed in accordance with protection class1l! It must therefore be operated with protective earth/GND connection. Use only a three conductor AC power cable with a protective earth conductor that meets the IEC safety standards!*

Figure 3-4: Power Connection (sample 3.5U)

3.4.2 Power Supply

The power supply has the following main features:

- High efficiency
- Low Ripple & Noise
- Output over voltage protection
- Short circuit protection on all outputs
- Remote on/off control
- Approved by UL, TUV, CCC, CB &CE
- INTERNAL 40mm fan
- 100% burn-in be performed for 1 hour at full load
- MTBF:171K hours
- Active power factor correction
- Complies with IEC-1000-3-2 Class D
- AC input full range

Technical data

Input voltage	90…264VAC,
Input frequency	47…63Hz
Input current	2A (RMS) for 115V / 3A (RMS) for 230V
Inrush current	35A max. for 115VAC/ 70A max. for 230 VAC
Efficiency	78-82% at 230V in and load condition: 12V/9.92A, 5V/6.33A, 3.3V/5.43A, -12V/ 0.21A, 5VSB/1.77A
Overload protection	110-160% max.
Over voltage protection	+5V output: 5.6-6.5V +3,3V output: 3.6-4.3V +12V output: 13.2 – 15V
Ripple & Noise	+3,3V 50mV/ +5V 50mV/ +12V 120mV/ -12V 120mV/ +5VSB 50mV
Voltage regulation	+3,3V ±5% / +5V ±5% / +12V ±5% / -12V ±10% / +5VSB ±5%
Hold up time	34msec. min. at 115V full load
Power Good Signal	on delay 100…550msec., off delay 1msec
Isolation voltage	Input/frame ground 1800 VAC for 1sec. Input/Output 1800 VAC for 1sec.
Operating temperature	0°C…+50°C
Storage temperature	-20°C…+80°C
Operating humidity	20…80%
MTBF (MIL-HDBK-217F)	171.000h
Safety	To meet UL, CUL, TUV; CCC
EMC	IEC-1000-3-2 Class D
Dimensions (L x W x H)	150x82x40mm, ±0,5mm
Remote on/off control	The power supply shall accept a logic open collector level which disable/enable all the output voltage (exclude +5V SB). As logic level is low, outputs voltage were enable, as logic level is high, outputs voltage were disable

Output Current

+3,3V		+5V		+12V		-12V		5V SB	
Min	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
0A	12.0A	0A	14.0A	0.1A	14.0A	0A	0.3A	0A	2.5

+3.3V & +5V total output not exceed 70W

+3.3V & +5V & +12V & -12V total output not exceed 168W

This power supply is for assembly purposes only. It must not operate in unassembled condition.

The final assembly has to comply to the valid EMC standards.

Figure 3-5: ATX Power Supply 180W, 3U, 10HP (or similar)

For DC Power Supply, please ask Hartmann Elektronik.

3.5 Cooling

The operating temperature is from 0°C to 40°C.

3.5.1 CPCI Basic 3U

The CPCI front and rear I/O boards are cooled by heat dissipation through convection (from bottom to top). The operating temperature is from 0°C to 40°C.

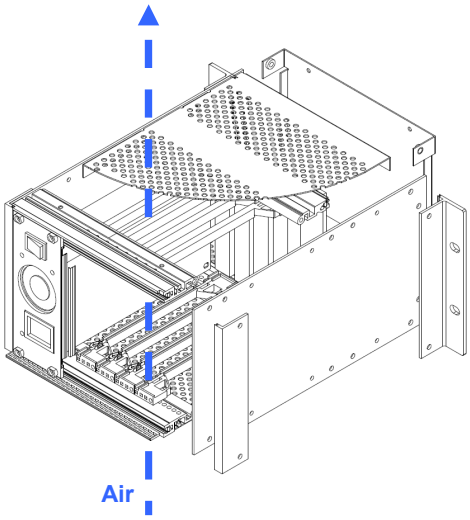


Figure 3-6: Air Flow (convection)

3.5.2 CPCI Basic 3,5U

The front boards are cooled by forced air convection through two DC axial fans 80 x 80 x 25 mm in Front and two DC axial fans 80 x 80 x 15 mm in Rear.

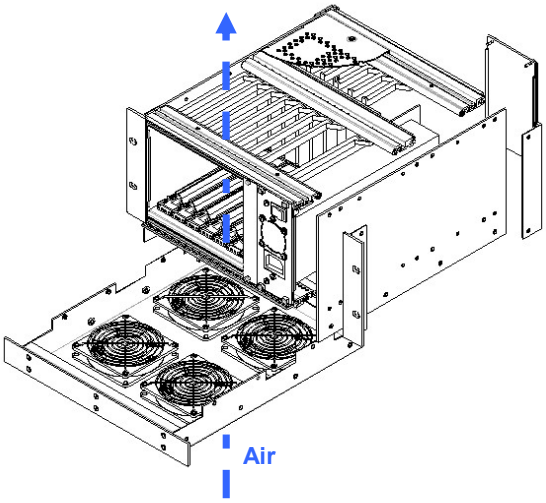


Figure 3-7: Air Flow with fan tray

Caution!

To ensure proper air flow within the system make sure that all slots are populated with either boards or filler panels.

3.5.3 Fans

General Specification

- Motor Protection: Auto Restart/Polarity Protection
- Isolation Resistance between housing and positive lead wire: 10M Ω at DC500V

Technical data DC fan 80 x 80 x 15 mm

Dimensions:	80mm x 80mm, 15mm thick
Rated Voltage:	12V
Operating Voltage	6,0 – 13,8V
Rated Current	0,185A
Rated Input:	2,16W
Rated Speed:	3200min^{-1}
Air Flow:	29,9 cfm
Static Pressure:	0,129 inchH_2O
Noise:	33,4dB(A)
Bearing	Ball Bearing
Operating Temperature	-10°C - +70°C
Storage Temperature	-40ºC to +70ºC
Dielectric Withstand Voltage	1500VAC 60s
Life Expectancy	50.000h (25°C)
Material	Casing: glass filled polyester (P.B.T) 94V-0 Fan blade: glass filled polyester (P.B.T) 94V-0 Lead Wire: UL1007, AWG24, +red, -black

Technical data DC fan 80 x 80 x 25 mm

Dimensions:	80mm x 80mm, 25mm thick
Rated Voltage:	12V
Operating Voltage	6,0 – 13,8V
Rated Current	0,27A
Rated Input:	3,24W
Rated Speed:	5300 min^{-1}
Air Flow:	28,5cfm
Static Pressure:	0,27 in H_2O
Noise:	38dB(A)
Bearing	Ball Bearing
Operating Temperature	-10°C - +70°C
Storage Temperature	-40ºC to +70ºC
Dielectric Withstand Voltage	AC 700V 1s
Life Expectancy	40.000h (25°C)
Material	Casing: Plastic (Black) (P.B.T) 94V-0 Impeller: Plastic (Black) (P.B.T) 94V-0 Lead Wire: UL1007, AWG24, +red, -black

4 Installation

This section provides set up information and operation for the subrack:

- Subrack Components
- Inspecting the Components
- Protection Against Electromagnetic Interference
- Preparing the Subrack

4.1 Subrack Components

The subracks comes equipped with the following components:

- One ATX power supply 180W AC
- One CPCI backplane compliant with PICMG 2.0 R3.0 specification.

CPCI Basic 3U

- CPCI card rack, 3U, 30, 250mm deep
- 4-slot front and 4 RTM slots

CPCI Basic 3,5U

- CPCI card rack, 3,5U, 42, 280mm deep
- 7-slot front and 7 RTM slots
- One fan tray with 2 x DC fans: 80 x 80 x 15mm, and 2 x DC fans 80 x 80 x 25mm

4.2 Inspecting the Subrack Components

During the course of handling, shipping, and assembly, pins, shrouds, mounting screws, fans and other items can become damaged and/or loose.

WARNING: Before utilizing the subrack, perform a thorough inspection to ensure the subrack and its components are not damaged.

- To inspect the subrack:

1. Visually inspect the subrack to ensure that all of the connector pins are straight, screws are tight, and so on.
2. Check to ensure none of the EMI gaskets are damaged.

4.3 Protection Against Electromagnetic Interference

The subrack contains gaskets at the shelf and board level to guard against electromagnetic interference (EMI). Ensure that the subrack is grounded and that each of the subrack individual components make contact with the gaskets.

Follow the proper grounding and ESD handling procedures.

4.4 Preparing the Subrack

Side flanges are provided to allow the shelf unit to be mounted in a 19” (482.6 mm) cabinet. In preparing the subrack perform the following:

- Mounting the Subrack
- Powering the Subrack
- Installing Boards
- Installing Filler Panels

4.4.1 Mounting the Subrack

The subrack system CPCI Basic 3U (order no.: LMH0000111) can be wall-mounted.

The subrack systems CPCI Basic 3.5U (order no.: LMH0000390 and LMH0000400) can be installed in equipment like corresponding racks or cabinets

4.4.2 Powering the Subrack

Before inserting boards, power the subrack to ensure that it is operating properly. The power connections and the mains switch are located at the front of the shelf

- Ensure that the AC switch is set to the off (O) position.
- Connect the mains AC cable (C14, 10 Amp, not supplied) to the AC inlet.
- Turn the AC switch to the on (I) position.

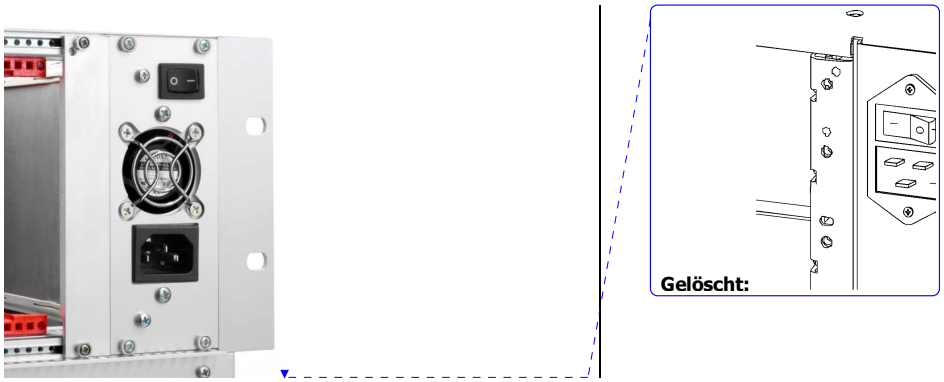


Figure 4-1: AC Input (sample: CPCI Basic 3,5U version)

4.4.3 Installing Boards

The shelf is compliant with:

- CPCI Standard PICMG 2.0 R3.0

and accepts boards that are compliant with the:

- CPCI Standard PICMG 2.0 R3.0. and

⚠	**WARNING:** Boards should slide easily when installing or removing them from the shelf. Forcing the boards may cause damage to the interface connector pins.

4.4.4 Installing Filler Panels

Filler panels consists of a front panel (with or w/o air baffles), EMC gasket and mounting screws.

⚠	**WARNING:** Close all empty subrack slots with filler panels. The filler panel prevents fan air from escaping out open slots.

5 Service

5.1 Technical support and Return for Service Assistance

Please return the complete subrack system. For all product returns and support issues, please contact your Hartmann sales distributor or www.hartmann-elektronik.de

Please use the original packing material. Shipping without the original packing material might void the warranty.

5.2 Declaration of Conformity

The HARTMANN CPCI system platform Basic subracks are developed and manufactured according to EN 60950-1.

The HARTMANN CPCI system platform Basic subracks are not end-products with independent functionality according the EMC regulations, therefore CE marking is not required. Not before CPCI boards are plugged into the subrack, the systems fulfill the requirements in accordance with EMC Directive 2004/108/EG and Low-voltage Directive 2006/95/EG.

With the EMC optimized enclosure design and the high quality power input filters for the mains connection offers HARTMANN CPCI systems serve an ideal base for system Integrators, which comply with the limits of EN 6100-6-3 and EN 61000-6-2

A functionality test and protective earth test is carried out on each system.

The included power supplies are in accordance with EN 60950-1, EN 55022 / FCC Class A IEC 61000-3-2 HARMONIC.

5.3 Scope of Delivery

Subrack	Quantity	Description
CPCI Basic 3U	1	CPCI card rack, screened, with rear panel, made of galvanized sheet steel, cover and bottom plate perforated, with IEEE guide rails and ESD clip mounted at the bottom
	1	CPCI backplane: 3U, 4 slots, ADC (Automatic Daisy Chain), active termination, with ATX-Connector
CPCI Basic 3,5U	1	CPCI card rack, screened, with rear panel, made of chromated aluminum, cover and bottom plate perforated, with IEEE guide rails and ESD clip mounted at the bottom
	1	CPCI backplane: 3U, 7 slots, ADC (Automatic Daisy Chain), active termination, with ATX-Connector
	1	Partial front panel 12HP, 3U with EMC gasket
	1	Partial front panel 4HP 3U with EMC gaskets
	2	DC fans: 80 x 80 x 25 mm
	2	DC fans: 80 x 80 x 15 mm
	1	DC cabling

5.4 Subrack Specifications

Dimensions	**CPCI Basic 3U**	
	Height	132,5mm
	Width	208,4mm
	Depth (front card cage)	for Boards: 160mm
	Depth (subrack)	250mm
	CPCI Basic 3,5U	
	Height	154,7mm
	Width	208,4mm
	Depth (front card cage)	for Boards: 160mm
	Depth (subrack)	280mm
Weight	**CPCI Basic 3U**	2,7kg
	CPCI Basic 3,5U	3,8kg
ATX Power Supply	Input	90 – 264 VAC
	Frequency	47 – 63 Hz
	Output Power	180 W
DC Power Supply	optional	
Cooling	**CPCI Basic 3,5U**	4 x DC fans: 80 x 80
Temperature:	Operating	0°C to +40°C
	Storage	-20°C to +70°C
	Transport	-20°C to +70°C
Humidity:	Operating	5% to 80% non-condensing
	Storage	5% to 80% non-condensing
	Transport	5% to 80% non condensing
Shock		MIL-STD-810F 1 Jan 2000 Annex C, U.S highway truck Figure 514.5C-1, vertical Shock test (Sawtooth) Figure 516.5-10
Vibration:		DIN EN 61373:1999, Figure 2, Category 1, Class B MIL-STD-810F 1 Jan 2000 Annex C, Shipboard: Figure 514.5C-15
EMC	Emissions	EN 61000-6-3
	Immunity	EN 61000-6-1
Safety		Test voltages according to EN 60950-1
Electromagnetic Shielding		Typ.40 dB at 1 GHz (with front panels)
Regulatory Compliance: ……		EN60950-1